(2) Factors to consider when calculating the anticipated controlling depth;

(3) Consideration of weather or environmental conditions; and

(4) Conditions which mandate when the tank barge owner or operator shall be contacted prior to port entry or getting underway; if no such conditions exist, the guidance must contain a statement to that effect.

[CGD 91–045, 62 FR 49608, Sept. 23, 1997]

§ 157.460 Additional operational requirements for tank barges.

(a) *Emergency steering capability.* The owner or operator of each tank barge shall not permit the barge to be towed unless, by November 27, 1997, the primary towing vessel has—

(1) A steering gear system with a main power unit, an alternative power unit, and two remote steering gear control systems, except that separate steering wheels or steering levers are not required. The steering gear control systems must be arranged so that if the system in operation fails, the other system can be brought into immediate operation from a position on the navigating bridge; or

(2) Twin screw propulsion with separate control systems for each propeller.

(b) *Fendering system.* An owner or operator of a tank barge shall not permit the barge to be towed unless the primary towing vessel and any fleeting or assist towing vessels have a fendering system that is of substantial size and composition to prevent metal to metal contact between the towing vessel and the barge during maneuvering operations.

[CGD 91–045, 61 FR 39790, July 30, 1996; 61 FR 41685, Aug. 9, 1996]

Subpart H—Interim Measures for Certain Tank Vessels Without Double Hulls Carrying Animal Fat or Vegetable Oil

SOURCE; CGD 91–045, 61 FR 39791, July 30, 1996, unless otherwise noted.

§ 157.500 Purpose and applicability.

(a) The purpose of this subpart is to establish mandatory safety and operational requirements to reduce environmental damage resulting from the discharge of animal fat or vegetable oil.

(b) This subpart applies to each tank vessel specified in § 157.01 of this part that—

(1) Is 5,000 gross tons or more;

(2) Carries animal fat or vegetable oil in bulk as cargo or cargo residue; and

(3) Is not equipped with a double hull meeting § 157.10d of this part, or an equivalent to the requirements of § 157.10d, but required to be equipped with a double hull at a date set forth in 46 U.S.C. 3703a (b)(3) and (c)(3).

§ 157.510 Operational measures.

An owner or operator of a tank vessel that carries animal fat or vegetable oil in bulk as cargo or cargo residue shall comply with the requirements in all sections of subpart G of this part.

Subpart I—Interim Measures for Certain Tank Vessels Without Double Hulls Carrying Other Non–Petroleum Oil

SOURCE; CGD 91–045, 61 FR 39791, July 30, 1996, unless otherwise noted.

§ 157.600 Purpose and applicability.

(a) The purpose of this subpart is to establish mandatory safety and operational requirements to reduce environmental damage resulting from the discharge of other non-petroleum oil.

(b) This subpart applies to each tank vessel specified in § 157.01 of this part that—

(1) Is 5,000 gross tons or more;

(2) Carries other non-petroleum oil in bulk as cargo or cargo residue; and

(3) Is not equipped with a double hull meeting § 157.10d of this part, or an equivalent to the requirements of § 157.10d, but required to be equipped with a double hull at a date set forth in 46 U.S.C. 3703a (b)(3) and (c)(3).

§ 157.610 Operational measures.

An owner or operator of a tank vessel that carries other non-petroleum oil in bulk as cargo or cargo residue shall comply with the requirements in all sections of subpart G of this part.

APPENDIX A TO PART 157—DAMAGE ASSUMPTIONS, HYPOTHETICAL OUTFLOWS, AND CARGO TANK SIZE AND ARRANGEMENTS

1. *Source.* The procedures for the damage assumption calculations contained in this Appendix conform to Regulations 22, 23, and 24 of Annex I of the International Convention for the Prevention of the Pollution from Ships, 1973, done at London, November 2, 1973.

2. *Assumptions.* For the purpose of calculating hypothetical outflow from tank vessels, three dimensions of the extent of damage of a parallelepiped on the side and bottom of the vessel are assumed.

(a) For side damage, the conditions are as follows:

Damage	Conditions
(1) Longitudinal extent l_c	$\frac{1}{3} L^{2/3}$ or 14.5 m, whichever is less.
(2) Transverse extent (t_c) (inboard from the vessel's side at right angles to the centerline at the level corresponding to the assigned summer freeboard).	B —or 11.5 m, whichever is 5 less.
(3) Vertical extent (v_c)	From the base line upwards without limit.

(b) For bottom damage, two conditions to be applied individually to the stated portions of the vessel, as follows:

Damage	Conditions	
	For 0.3L from the forward perpendicular of ship	Any other part of ship
(1) Longitudinal extent (l_s)	L/10	L/10 or 5 meters, whichever is less.
(2) Transverse extent (t_s)	B/6 or 10 meters, whichever is less but not less than 5 meters.	5 meters.
(3) Vertical extent from the base line (v_s).	B/15 or 6 meters, whichever is less	B/15 or 6 meters, whichever is less.

3. *Hypothetical Outflow of Oil.* (a) The hypothetical outflow of oil in the case of side damage (O_c) and bottom damage (O_s) is calculated by the following formula with respect to compartments breached by damage to all conceivable locations along the length of the vessel to the extent as defined in section 2 of this Appendix.

(1) For side damages: Formula

$$O_c = \Sigma W_i + \Sigma K_i C_i$$

(2) For bottom damage: Formula II

$$O_s = \tfrac{1}{3}(\Sigma Z_i W_i + \Sigma Z_i C_i)$$

Where:

W_i=Volume of a wing tank assumed to be breached by the damage as specified in section 2 of this Appendix; W_i for a segregated ballast tank may be taken equal to zero;

C_i=Volume of a center tank assumed to be breached by the damage as specified in section 2 of this Appendix; C_i for a segregated ballast tank may be taken equal to zero;

$$K_i = 1 - \frac{b_i}{t_c}$$

when b_i is equal to or greater than t_c, K_i is equal to zero;

$$Z_i = 1 - \frac{h_i}{v_s}$$

when h_i is equal to or greater than v_s, Z_i is equal to zero;

b_i=Minimum width of wing tank under consideration measured inboard from the vessel's side at right angles to the centerline at the level corresponding to the assigned summer freeboard; and

h_i=Minimum depth of the double bottom under consideration; where no double bottom is fitted, h_i is equal to zero.

(b) If a void space or segregated ballast tank of a length less than l_c is located between wing oil tanks, O_c in formula I of this section may be calculated on the basis of volume W_i being the actual volume of one such tank (where they are of equal capacity) or the smaller of the two tanks (if they differ in capacity), adjacent to such space, multiplied by S_i as defined below and taking for all other wing tanks involved in such a collision the value of the actual full volume.

$$S_i = 1 - \frac{l_i}{l_c}$$

Where l_i=length of void space or segregated ballast tank under consideration.

(c) Credit is only given in respect to double bottom tanks which are either empty or carrying clean water when cargo is carried in the tanks above.

(1) If the double bottom does not extend for the full length and width of the tank involved, the double bottom is considered nonexistent and the volume of the tanks above the area of the bottom damage must be included in formula II of this section even if the tank is not considered breached because of the installation of such a partial double bottom.

(2) Suction wells may be neglected in the determination of the value h_i if such wells

are not excessive in area and extend below the tank for a minimum distance and in no case more than half the height of the double bottom. If the depth of such a well exceeds half the height of the double bottom, h_i is taken equal to the double bottom height minus the well height.

(d) In the case where bottom damage simultaneously involves four center tanks, the value of O_s may be calculated according to formula III as follows:

$O_s = 1/4(\Sigma Z_i W_i + \Sigma Z_i C_i)$

(e) Credit for reduced oil outflow from bottom damage may be applied to formula III for an installed emergency high suction cargo transfer system that:

(1) transfers within two hours oil equal to one half of the volume of the largest tank involved;

(2) has sufficient ballast or cargo tankage available to receive the transferred oil; and

(3) has the high suction piping installed at a height not less than the vertical extent of bottom damage (v_s).

4. *Allowable volumes of cargo tanks.*

(a) The allowable volume of a wing cargo tank (VOL_w) is equal to seventy-five percent of O_A. In a segregated ballast tank vessel VOL_w may equal O_A for a wing cargo oil tank located between two segregated ballast tanks each of length greater than l_c and width greater than t_c.

(b) The allowable volume of a center cargo tank (VOL_c) is 50,000 cubic meters.

5. *Allowable length of cargo tanks.*

The length of each cargo tank (*1* a) must not exceed 10 meters or the distance calculated from (a), (b), or (c), as appropriate, whichever is greater:

(a) Where no longitudinal bulkhead is provided inside the cargo tanks: *1* a=[0.5(bi/B)+0.1] L, but not to exceed 0.2L.

(b) Where a centerline longitudinal bulkhead is provided inside the cargo tanks: *1* a=[0.25(bi/B)+0.15] L, but not to exceed 0.2L.

(c) Where two or more longitudinal bulkheads are provided inside the cargo tanks:

(1) For wing cargo tanks: *1* a = 0.2L.

(2) For center cargo tanks:

(i) If (bi/B) is equal to or greater than 0.2, *1* a = 0.2L.

(ii) If (bi/B) is less than 0.2:

(A) Where no centerline longitudinal bulkhead is provided, *1* a = [0.5(bi/B) + 0.1] L.

(B) Where a centerline longitudinal bulkhead is provided, *1* a = [0.25(bi/B) + 0.15] L.

(d) "bi" is the minimum distance from the ship's side to the outer longitudinal bulkhead of the tank in question, measured inboard at right angles to the centerline at the level corresponding to the assigned summer freeboard.

[CGD 74–32, 40 FR 48283, Oct. 14, 1975, as amended by CGD 74–32, 40 FR 49328, Oct. 22, 1975; CGD 90–051, 57 FR 36245, Aug. 12, 1992]

APPENDIX B TO PART 157—SUBDIVISION AND STABILITY ASSUMPTIONS

1. *Source.* The procedures for the loading assumption calculations contained in this Appendix conform to Regulation 25 of Annex I of the International Convention for the Prevention of the Pollution from Ships, 1973, done at London, November 2, 1973.

2. *Loading Assumptions.* For the purpose of calculating subdivision and damage stability for a tank vessel, the operating drafts must reflect actual partial or full load conditions consistent with trim and strength of the vessel. Ballast conditions need not be considered if the tank vessel is not carrying oil in cargo tanks excluding oily residues. Loading condition must reflect the specific gravities of the cargo.

3. *Damage Assumptions.*

(a) Damage is applied to all conceivable locations along the length of the vessel as follows:

(1) For a vessel of more than 225 meters in length, anywhere in the vessel's length.

(2) For a vessel of more than 150 meters, but not exceeding 225 meters in length, anywhere in the vessel's length except where the after or forward bulkhead bounding a machinery space located aft is involved in the damage assumption. The machinery space is calculated as a single floodable compartment.

(3) For a vessel 150 meters or less in length, anywhere in the vessel's length between adjacent transverse bulkheads except the machinery space.

(b) The extent and the character of the assumed side or bottom damage, as defined in section 2 of Appendix A of this part, must be applied except longitudinal bottom damage within 0.3L from the forward perpendicular must be assumed to be the same as that for side damage. If any damage of lesser extent results in a more severe condition, such damage must be assumed.

(c) If damage involves transverse bulkheads as specified in paragraphs (a)(1) and (2) of this section, transverse watertight bulkheads must be spaced at least at a distance equal to the longitudinal extent of the assumed damage specified in paragraph (b) of this section in order to be considered effective. Where transverse bulkheads are spaced at a lesser distance, one or more of these bulkheads within such extent of damage must be assumed as nonexistent for the purpose of determining flooded compartments.

(d) If the damages between adjacent transverse watertight bulkheads is within the definition contained in paragraph (a)(3) of this section, no main transverse bulkhead or a transverse bulkhead bounding side tanks or double bottom tanks is to be assumed damaged, unless:

(1) the spacing of the adjacent bulkheads is less than the longitudinal extent of assumed

damage defined in paragraph (b) of this section; or

(2) there is a step or a recess in a transverse bulkhead of more than 3.05 meters in length, located within the extent of penetrations of assumed damage. The step formed by the after peak bulkhead and after peak tank top is not regarded as a step for these calculations.

(e) If pipes, ducts, or tunnels are situated within the assumed extent of damage, there must be arrangements so that progressive flooding may not thereby extend to compartments other than those assumed to be floodable for each case of damage.

(f) For oil tankers of 20,000 DWT and above, the damage assumptions must be supplemented by the following assumed bottom raking damage:

(1) Longitudinal extent:

(i) For ships of 75,000 DWT and above, 0.6L measured from the forward perpendicular.

(ii) For ships of less than 75,000 DWT, 0.4L measured from the forward perpendicular.

(2) Transverse extent: B/3 anywhere in the bottom.

(3) Vertical extent: Breach of the outer hull.

4. *Characteristic and Condition Assumption for Calculations.*

(a) Account must be taken of any empty or partially filled tanks, the specific gravity of cargoes carried, and any outflow of liquids from damaged compartments.

(b) The permeabilities are assumed as follows:

Intended space use	Permeability
Stores	0.60
Accommodation	0.95
Machinery	0.85
Voids	0.95
Consumable liquids	[1] 0 or 0.95
Other liquids	[2] 0 or 0.95

[1] Whichever results in the more severe requirements.
[2] The permeability of partially filled compartments must be consistent with actual density and the amount of liquid carried.

(c) The buoyancy of any superstructure directly above the side damage is to be disregarded. The unflooded parts of superstructures beyond the extent of damage may be taken into consideration if they are separated from the damaged space by watertight bulkheads and no progressive flooding of these intact spaces takes place. Class I doors are allowed in watertight bulkheads in the superstructure.

(d) The free surface effect is to be calculated:

(1) at an angle of heel of 5 degrees for each individual compartment; or

(2) by assessing the shift of liquids by moment of transference calculations.

(e) In calculating the effect of free surfaces of consumable liquids, it is to be assumed that, for each type of liquid, at least one transverse pair or a single centerline tank has a free surface and the tank or combination of tanks to be taken into account is to be those where the effect of free surface is the greatest.

[CGD 74–32, 40 FR 48283, Oct. 14, 1975, as amended by USCG–2000–7641, 66 FR 55573, Nov. 2, 2001]

APPENDIX C TO PART 157—PROCEDURE FOR DETERMINING DISTRIBUTION OF SEGREGATED BALLAST TANKS TO PROVIDE PROTECTION AGAINST OIL OUTFLOW IN THE EVENT OF GROUNDING, RAMMING, OR COLLISION

1. *Source.* The procedure for determining the distribution of segregated ballast tanks contained in this appendix conforms to Regulation 13E of the MARPOL Protocol.

2. *Procedure.* Protective location of segregated ballast tanks, voids, and other spaces that do not carry cargo which are within the cargo tank length is determined from the following:

$$\Sigma PA_c + \Sigma PA_s = J[L_t(B + 2D)]$$

Where:

PA_c=the side shell area in square meters based on projected molded dimensions for each segregated ballast tank, void, or other space that does not carry cargo and which complies with paragraph 2(b) of this appendix;

PA_s=the bottom shell area in square meters based on projected molded dimensions for each segregated ballast tank, void, or other space that does not carry cargo and which complies with paragraph 2(b) of this appendix;

L_t=the length in meters between the forward and after extremities of the cargo tanks;

B=the maximum breadth of the ship in meters measured amidship to the molded line of the frame; and

D=the molded depth in meters measured vertically from the top of the keel plate to the top of the freeboard deck beam at the side amidships. In tank vessels having rounded gunwales, the molded depth is measured from the top of the keel plate to the point of intersection of the molded lines of the deck and side shell plating, the lines being extended as though the gunwale were of angular design.

(a) *Method of determining a value for J.*

(1) For tank vessels for 20,000 DWT, J=0.45.

(2) For tank vessels of 200,000 DWT or more:

(i) J=0.30; or

(ii) J=the greater of 0.20, or

$$0.30 - \left[a - \frac{(O_c + O_s)}{40_A} \right] ,$$

where:

a=0.25 for tank vessels of 200,000 DWT.
a=0.40 for tank vessels of 300,000 DWT.
a=0.50 for tank vessels of 420,000 DWT.

For values of DWT between 200,000 and 300,000 DWT, 300,000 and 420,000 DWT, and greater than 420,000 DWT, the value of "a" is determined by linear interpolation.

O_c = as calculated in Appendix A of this part.
O_s = as calculated in Appendix A of this part.
O_A = the allowable oil outflow meeting §157.19(b)(1) of this part.

(3) For values of DWT between 20,000 and 200,000 DWT, the value of "J" is determined by linear interpolation between 0.45 and 0.30 respectively.

(b) PA_c and $PA_{s\leq}$ *Criteria for determining the segregated ballast tanks, voids, and other spaces that do not carry cargo.*

The following criteria are to be met for a segregated ballast tank, void, or space that does not carry cargo, to be used in determining PA_c and $PA_{s\leq}$

(1) The minimum width of each wing tank or space, either of which extends for the full depth of the vessel's side or from the main deck to the top of the double bottoms is 2 meters or more. The width is measured inboard from the vessel's side shell plating at right angles to the vessel's center line. If a wing tank or space has a width anywhere within it that is less than 2 meters, that wing tank or space is not used when calculating PA_c.

(2) The minimum vertical depth of each double bottom tank or space is B/15 or 2 meters, whichever is smaller. If a double bottom tank or space has a depth less than B/15 or 2 meters, whichever is smaller, anywhere within it, the double bottom or space is not to be used when calculating PA_s.

(3) The minimum width of a wing tank or space is not measured in the way of—

(i) the turn of the bilge area; or

(ii) a rounded gunwale area.

(4) The minimum depth of a double bottom tank or space is not measured in the way of the turn of the bilge area.

[CGD 77–058b, 45 FR 43716, June 30, 1980]

APPENDIX D TO PART 157—EXAMPLE OF A PROCEDURE FOR DEDICATED CLEAN BALLAST TANKS OPERATIONS

1. *Source.* The example procedure for dedicated clean ballast tanks operation contained in this appendix conforms to the Annex of Resolution 14 of the MARPOL Protocol.

2. *Example Procedure.* Dedicated clean ballast tanks operational procedure:

(a) Before arrival at the loading port:

(1) Transfer all remaining oily mixtures to a cargo tank.

(2) Ensure that the pumping and piping designated for clean ballast operation have been properly cleaned to accommodate simultaneous discharge of clean ballast while loading.

(3) Ensure that all valves to the slop tank and the cargo tanks are closed.

(4) Perform visual inspection of all dedicated clean ballast tanks and their contents, if any, for signs of contamination.

(5) Discharge a sufficient amount of clean ballast water to ensure that remaining ballast water and cargo to be loaded will not exceed the permissible deadweight or draft. Leave a sufficient amount of water for flushing the piping, and as a minimum, a quantity equal to 10 times the volume of the affected piping.

(6) Ensure that all valves to the dedicated clean ballast tanks are closed.

(7) If no further ballast discharge is anticipated, drain the clean ballast piping.

(b) In the loading port:

(1) Perform normal loading operations of cargo tanks.

(2) Ensure sufficient slop tank capacity is available for subsequent reception of cargo pump and piping flushings.

(3) When applicable, discharge remaining clean ballast before entire piping system is used for loading. Leave the required minimum quantity of flushing water in ballast tanks.

(4) Ensure that all valves to the dedicated clean ballast tanks are closed.

(5) Ensure that all valves to the cargo tank are closed upon completion of loading.

(c) After departure from the loading port:

(1) Flush appropriate pumping and piping with sufficient water from dedicated clean ballast tanks into a slop tank.

(2) Ensure that valves to the slop tank are closed before pumping the remaining clean water overboard and monitoring oil content of the water.

(3) Ensure that all valves in the dedicated clean ballast tanks are closed.

(d) Before arrival at the unloading port:

(1) Ensure that all valves to the slop tank and cargo tanks are closed.

(2) Recheck that the pumping and piping designated for clean ballast operation have been properly cleaned.

(3) Ballast through clean cargo pumps and piping, considering the port's draft requirements.

(4) Ensure that all valves in the dedicated clean ballast tanks are closed.

(e) In the unloading port:

(1) Allocate pumping and piping intended for clean ballast operation.

(2) Perform normal unloading operations.

(3) As soon as draft conditions permit, complete ballasting to departure conditions.

(4) Ensure that all valves to the dedicated clean ballast tanks are closed.

(5) Complete unloading.

(f) After departure from the unloading port:

(1) Flush pumps and piping servicing the dedicated clean ballast tanks into the slop tank.

(2) Top up dedicated clean ballast tanks.

(3) Process the slop tank content in accordance with load on top (LOT) procedures.

[CGD 77–058b, 45 FR 43717, June 30, 1980, as amended by USCG–2000–7641, 66 FR 55573, Nov. 2, 2001]

APPENDIX E TO PART 157—SPECIFICATIONS FOR THE DESIGN, INSTALLATION AND OPERATION OF A PART FLOW SYSTEM FOR CONTROL OF OVERBOARD DISCHARGES

Source. Appendix 2 to Annex 5 of IMO's Marine Environment Protection Committee document MEPC/Circ. 97. Paragraphs 1 and 2 are printed for information. Paragraphs 3, 4, and 5 are incorporated into §§157.11 and 157.37.

Note: Information in square brackets on Figure 1 has been added by the Coast Guard for clarity.

1 *Purpose*

The purpose of these Specifications is to provide specific design criteria and installation and operational requirements for the part flow system referred to in Regulation 18(6)(e) of Annex I of the International Convention for the Prevention of Pollution from Ships, 1973 as modified by the Protocol of 1978 relating thereto.

2 *Application*

2.1 Existing oil tankers may, in accordance with Regulation 18(6)(e) of Annex I of MARPOL 73/78, discharge dirty ballast water and oil contaminated water from cargo tank areas below the waterline, provided part of the flow is led through permanent piping to a readily accessible location on the upper deck or above where it may be visually observed during the discharge operation and provided that the arrangements comply with the requirements established by the Administration and which shall at least contain all the provisions of these Specifications.

2.2 The part flow concept is based on the principle that the observation of a representative part flow of the overboard effluent is equivalent to observing the entire effluent stream. These specifications provide the details of the design installation, and operation of a part flow system.

3 *General Provisions*

3.1 The part flow system shall be so fitted that it can effectively provide a representative sample of the overboard effluent for visual display under all normal operating conditions.

3.2 The part flow system is in many respects similar to the sampling system for an oil discharge monitoring and control system but shall have pumping and piping arrangements separate from such a system, or combined equivalent arrangements acceptable to the Administration.

3.3 The display of the part flow shall be arranged in a sheltered and readily accessible location on the upper deck or above, approved by the Administration (e.g. the entrance to the pump room). Regard should be given to effective communication between the location of the part flow display and the discharge control position.

3.4 Samples shall be taken from relevant sections of the overboard discharge piping and be passed to the display arrangement through a permanent piping system.

3.5 The part flow system shall include the following components:

.1 Sampling probes;

.2 Sample water piping system;

.3 Sample feed pump(s);

.4 Display arrangement;

.5 Sample discharge arrangement; and, subject to the diameter of the sample piping:

.6 Flushing arrangement.

.3.6 The part flow system shall comply with the applicable safety requirements.

4 *System Arrangement*

4.1 Sampling points.

4.1.1 Sampling point locations:

.1 Sampling points shall be so located that relevant samples can be obtained of the effluent being discharged through outlets below the waterline which are being used for operational discharges.

.2 Sampling points shall as far as practicable be located in pipe sections where a turbulent flow is normally encountered.

.3 Sampling points shall as far as practicable be arranged in accessible locations in vertical sections of the discharge piping.

4.1.2 Sampling probes:

.1 Sampling probes shall be arranged to protrude into the pipe a distance of about one fourth of the pipe diameter.

.2 Sampling probes shall be arranged for easy withdrawal for cleaning.

.3 The part flow system shall have a stop valve fitted adjacent to each probe, except that were the probe is mounted in a cargo line, two stop valves shall be fitted in series, in the sample line.

.4 Sampling probes should be of corrosion resistant and oil resistant material, of adequate strength, properly jointed and supported.

.5 Sampling probes shall have a shape that is not prone to becoming clogged by particle contaminants and should not generate high hydrodynamic pressures at the sampling probe tip. Figure 1 is an example of one suitable shape of a sampling probe.

.6 Sampling probes shall have the same nominal bore as the sample piping.

4.2 Sample piping:

.1 The sample piping shall be arranged as straight as possible between the sampling points and the display arrangement. Sharp bends and pockets where settled oil or sediment may accumulate should be avoided.

.2 The sample piping shall be so arranged that sample water is conveyed to the display arrangement within 20 seconds. The flow velocity in the piping should not be less than 2 metres per second.

.3 The diameter of the piping shall not be less than 40 millimetres if no fixed flushing arrangement is provided and shall not be less than 25 millimetres if a pressurized flushing arrangement as detailed in paragraph 4.4 is installed.

.4 The sample piping should be of corrosion-resistant and oil-resistant material, of adequate strength, properly jointed and supported.

.5 Where several sampling points are installed the piping shall be connected to a valve chest at the suction side of the sample feed pump.

4.3 Sample feed pump:

.1 The sample feed pump capacity shall be suitable to allow the flow rate of the sample water to comply with 4.2.2.

4.4 Flushing arrangement:

.1 If the diameter of sample piping is less than 40 millimetres, a fixed connexion from a pressurized sea or fresh water piping system shall be installed to enable flushing of the sample piping system.

4.5 Display arrangement:

.1 The display arrangement shall consist of a display chamber provided with a sight glass. The chamber should be of a size that will allow a free fall stream of the sample water to be clearly visible over a length of at least 200 millimetres. The Administration may approve equivalent arrangements.

.2 The display arrangement shall incorporate valves and piping in order to allow a part of the sample water to bypass the display chamber to obtain a laminar flow for display in the chamber.

.3 The display arrangement shall be designed to be easily opened and cleaned.

.4 The internal of the display chamber shall be white except for the background wall which shall be so coloured in order to facilitate the observation of any change in the quality of the sample water.

.5 The lower part of the display chamber shall be shaped as a funnel for collection of the sample water.

.6 A test cock for taking a grab sample shall be provided in order that a sample of the water can be examined independent of that in the chamber.

.7 The display arrangement shall be adequately lighted to facilitate visual observation of the sample water.

4.6 Sample discharge arrangement:

.1 The sample water leaving the display chamber shall be routed to the sea or to a slop tank through piping of adequate diameter.

5 *Operation*

5.1 When a discharge of dirty ballast water or other oil contaminated water from the cargo tank area is taking place through an outlet below the waterline, the part flow system shall provide sample water from the relevant discharge outlet at all times.

5.2 The sample water should be observed particularly during those phases of the discharge operation when the greatest possibility of oil contamination occurs. The discharge shall be stopped whenever any traces of oil are visible in the flow and when the oil content meter reading indicates oil content exceeds permissible limits.

5.3 On those systems that are fitted with flushing arrangements, the sample piping should be flushed after contamination has been observed and additionally it is recommended that the sample piping be flushed after each period of usage.

5.4 The ship's cargo and ballast handling manuals and, where applicable, those manuals required for crude oil washing systems or dedicated clean ballast tanks operation shall clearly describe the use of the part flow system in conjunction with the ballast discharge and the slop tank decanting procedures.

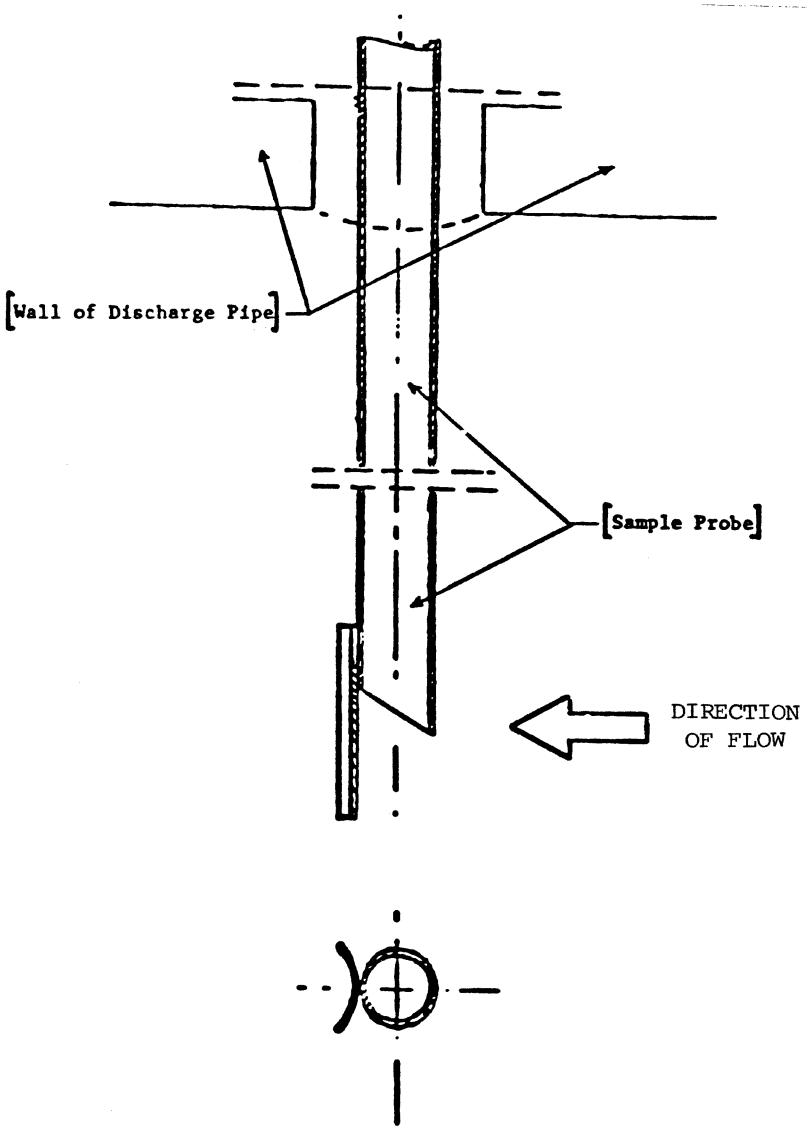

FIGURE 1

SAMPLING PROBE FOR A PART FLOW DISPLAY SYSTEM

[CGD 75–124a, 48 FR 45721, Oct. 6, 1983]

APPENDIX F TO PART 157—GUIDELINES AND SPECIFICATIONS FOR OIL DISCHARGE MONITORING AND CONTROL SYSTEMS FOR TANKERS

Source. IMO Resolution A.496(XII). Paragraphs 1, 2, 3, and 7 are printed for information. Paragraphs 4, 5, and 6 are incorporated into §157.12.

Mandatory Language. Wherever the word "should" is used in this appendix, substitute the word "shall". Compliance with these provisions is mandatory.

Note. Numbered footnotes have been added by the Coast Guard for clarity. Footnotes in the original text have been inserted parenthetically in the text and are identified by an asterisk.

1 *Purpose*

1.1 The purpose of these Guidelines and Specifications is:

.1 To provide a uniform interpretation of the requirements of Regulation 15(3)(a) of Annex I to the MARPOL 73/78 Convention(*1*), and

.2 To assist Administrations in determining appropriate design, construction and operational parameters for oil discharge monitoring and control systems when such systems are fitted in ships flying the flag of their State.

2 *Background*

2.1 The requirements of Annex I to the MARPOL 73/78 Convention relating to oil content monitoring of oil tanker ballast and tank washing water are contained in Regulation 15(3)(a), which stipulates that oil tankers of 150 tons gross tonnage and above shall be equipped with an approved oil discharge monitoring and control system and that the system shall record continuously:

.1 The discharge of oil in litres per nautical mile and total quantity of oil discharge; or

.2 In lieu of the total quantity of oil discharged, the oil content of the effluent and rate of discharge.

In both cases the record shall be "identifiable as to time and date" and shall be kept for at least three years.

2.2 Regulation 15 also stipulates that the system shall come into operation when there is any discharge of effluent into the sea and shall be such as will ensure that any discharge of oily mixture is automatically stopped when the instantaneous rate of discharge of oil exceeds that permitted by Regulation 9(1)(a). In existing oil tankers the stopping of the discharge may be performed manually and the rate of discharge may be estimated from the pump characteristics.

2.3 A test and performance specification for the basic oil content meter, indicating oil content in ppm, has been adopted by Resolution A.393(X).

2.4 Resolution A.445(XI) recognizes the need for early installation of oil discharge monitoring and control systems in order that operational experience can be gained. That resolution further invites the Marine Environment Protection Committee (MEPC) to develop guidelines for the progressive installation of oil discharge monitoring and control systems for new and existing oil tankers.

3 *Application*

3.1 An oil discharge monitoring and control system, approved by the Administration, shall be fitted in every oil tanker of 150 tons gross tonnage and above, and shall be fitted in:

.1 New (*as defined in Regulation 1(6))(*2*) tankers, on the date of entry into force of the Convention;

.2 Existing tankers, within three years of the date of entry into force of the Convention.

3.2 Existing tankers operating with a tank cleaning procedure using crude oil washing in accordance with Regulation 13(8) or with dedicated clean ballast tanks in accordance with Regulation 13(9) must fit an oil content meter not later than the first scheduled shipyard visit after entry into force of the Convention.

3.3 An incentive scheme to encourage the early installation of oil discharge monitoring and control systems (Resolution A.445(XI)) has been developed which allows different requirements depending on the date of installation of the system and the size and building date of the oil tanker. The terms used in the description of the various requirements are defined in section 4 below.

4 *Definitions*

4.1 "Oil discharge monitoring and control system"

4.1.1 Oil discharge monitoring and control system is a general term covering any one of the units referred to in paragraphs 4.2, 4.3, and 4.4.

4.2 "Control unit"

4.2.1 A control unit is a system which receives automatic signals of:

.1 Oil content;

.2 Flow rate of discharge;

.3 Ship's speed;

.4 Date and time (G.M.T.); and

.5 Discharge valve position (open or closed).

4.2.2 The unit shall make automatic recordings of:

.1 Instantaneous rate of discharge of oil;

.2 Total quantity of oil discharged;

.3 Date and time (G.M.T.);

.4 Discharge valve position (open or closed);

.5 Alarm condition;
.6 Failure (i.e. no flow, fault etc.); and
.7 Override action (i.e. manual override, flushing, calibration etc.).

4.2.3 The unit shall be fitted with a starting interlock and discharge valve control capability. The unit shall meet the specifications contained in the relevant paragraphs of section 6.

4.3 "Computing unit".

4.3.1 A computing unit is a system which receives automatic signals of:
.1 Oil content;
.2 Date and time (G.M.T.);
.3 Discharge valve activation;
.4 Flow rate of discharge; and
.5 Ship's speed in knots.
The flow rate and ship's speed may be manually inserted into the unit.

4.3.2 The unit shall make automatic recordings of:
.1 Instantaneous rate of discharge of oil;
.2 Total quantity of oil discharged;
.3 Date and time (G.M.T.);
.4 Discharge valve position (open or closed);
.5 Alarm condition;
.6 Failure (i.e. no flow, fault etc.);
.7 Override action;
.8 Manual input (i.e. speed, flow); and
.9 Oil content if the flow rate has been manually inserted.

4.3.3 Unless explicitly stated in the Implementation Requirements (see section 5 below) the unit need not be fitted with a starting interlock or discharge valve control capability.

4.3.4 The unit shall meet the specifications contained in the relevant paragraphs of section 6.

4.4 "Calculating unit".

4.4.1 A calculating unit is a system which received automatic signals of:
.1 Oil content;
.2 Flow rate of discharge; and
.3 Ship's speed.
The flow rate and ship's speed may be manually inserted into the unit.

4.4.2 The unit shall make an automatic recording of:
.1 Oil content, unless the oil content meter is provided with a recorder.

4.4.3 The unit shall display:
.1 Instantaneous rate of discharge of oil;
.2 Total quantity of oil discharged, unless permitted to be calculated manually.

4.4.4 The time and date, instantaneous rate of discharge of oil and, the total quantity of oil discharged may be recorded manually.

4.4.5 The unit need not be fitted with a starting interlock nor discharge valve control capability.

4.4.6 The unit shall meet the specifications contained in the relevant paragraphs of section 6.

4.5 "Starting interlock" is an automatic device which prevents the initiation of the opening of the discharge valve before the monitoring and control system is fully operational when use of this system is required by the Convention.

4.6 The "discharge valve control" is an automatic device which initiates the sequence to stop the overboard discharge.

5 *Implementation Requirements*

5.1 To assist in the implementation of Resolution A.445(XI), an implementation scheme has been developed by the MEPC which provides slightly different requirements for oil discharge monitoring and control systems depending on size and building date of the oil tanker. The scheme also allows for different requirements, depending on the installation date of the system.

5.2 Under the implementation scheme contained in paragraph 5.4 oil tankers of 150 tons gross tonnage and above have been arranged into five categories. Each category of oil tanker shall be fitted with an oil discharge monitoring and control system as set out below. The definitions given in section 4 should be consulted for a description of the different systems.

5.3 The implementation scheme set out in paragraph 5.4 gives details, with reference to paragraph 4, of the minimum equipment required to comply with this scheme. Where it is expedient to fit equipment of a higher category than required no objection shall be raised to this arrangement.

5.4 Implementation scheme:

5.4.1 Category I—

.1 An oil tanker of this category is of 4,000 tons deadweight and above and is a "new ship" as defined in Regulation 1(6) of Annex I of MARPOL 73/78 and the oil discharge monitoring and control system is installed on or after 1 June 1982.

.2 This category of ship shall be fitted with a control unit as defined under paragraph 4.2.

5.4.2 Category II—

.1 An oil tanker of this category is of 4,000 tons deadweight and above and is a "new ship" as defined in Regulation 1(6) of Annex I of MARPOL 73/78 and the oil discharge monitoring and control system is installed before 1 June 1982.

.2 This category of ship shall be fitted with a computing unit as defined under paragraph 4.3.

.3 The system shall also be fitted with a starting interlock and a discharge valve control.

5.4.3 Category III—

.1 An oil tanker of this category is of 150 tons gross tonnage and above, but less than 4,000 tons deadweight and is a "new ship" as defined in Regulation 1(6) of Annex I of MARPOL 73/78.

.2 This category of ship shall be fitted with a computing unit as defined under paragraph 4.3.

.3 No automatic devices are required to activate overboard discharge valve closure, neither is a starting interlock required.

5.4.4 Category IV(a)—

.1 An oil tanker of this category is of 20,000 tons deadweight and above and is an "existing ship" as defined in Regulation 1(7) of Annex I of MARPOL 73/78 and the oil discharge monitoring and control system is installed between one year and three years after the date of entry into force of MARPOL 73/78.

.2 This category of ship shall be fitted with a computing unit as defined under paragraph 4.3.

.3 The system shall also be fitted with a starting interlock, but need not be fitted with a discharge valve control.

.4 For oil tankers within this category up to and including 100,000 tons deadweight, where the overboard discharge has local manual control or where control is provided by means of extension rods, Administrations may grant waivers or exemptions from the requirement to fit a starting interlock system (*3*).

5.4.5 Category IV(b)—

.1 An oil tanker of this category is of 20,000 tons deadweight and above and is an "existing ship" as defined in Regulation 1(7) of Annex I of MARPOL 73/78 and the oil discharge monitoring and control system is installed not later than one year after the date of entry into force of MARPOL 73/78.

.2 This category of ship shall be fitted with a computing unit as defined under paragraph 4.3.

.3 No automatic devices are required to activate overboard discharge valve closure, neither is a starting interlock required.

5.4.6 Category V(a)—

.1 An oil tanker of this category is of 150 tons gross tonnage and above but less than 20,000 tons deadweight and is an "existing ship" as defined in Regulation 1(7) of Annex I of MARPOL 73/78 and the oil discharge monitoring and control system is installed between one year and three years after the entry into force of MARPOL 73/78.

.2 This category of ship shall be fitted with a calculating unit as defined under paragraph 4.4.

.3 No automatic devices are required to activate overboard discharge valve closure, neither is a starting interlock required.

5.4.7 Category V(b)—

.1 An oil tanker of this category is of 150 tons gross tonnage and above but less than 20,000 tons deadweight and is an "existing ship" as defined in Regulation 1(7) of Annex I to MARPOL 73/78 and the oil discharge monitoring and control system is installed not later than one year after the entry into force of MARPOL 73/78.

.2 This category of ship shall be fitted with a calculating unit as defined under paragraph 4.4. However, the total quantity of oil discharged may be computed manually.

.3 No automatic devices are required to activate overboard discharge valve closure, neither is a starting interlock required.

5.5 Shown at the Appendix is a summary, in tabular form, of the implementation requirements (*4*).

6 *Technical Specifications*

6.1 Oil discharge monitoring and control system:

6.1.1 The oil discharge monitoring and control system shall be so fitted that it can effectively monitor and control the discharge of any effluent into the sea through those overboard discharge outlets permitted by Regulation 18(2) which in the opinion of the Administration are necessary to fulfill the operational requirements of the tanker (*5*). The system should additionally cover:

.1 The gravitational discharge of ballast water from cargo tanks; and

.2 The midship cargo manifold arrangement when used to meet the requirements of Regulation 18.

6.1.2 The discharge of dirty ballast water or oil contaminated water into the sea through outlets which are not controlled by the monitoring and control system is an infringement of the Convention (*6*).

6.1.3 The system should function effectively, according to the criteria shown below, under all environmental conditions which vessels are normally assumed to encounter, and shall be designed and constructed to withstand the environmental conditions as specified in paragraph 6.1.6 of these Guidelines and Specifications:

.1 Except where manual operation of the system is permitted the system shall be so designed that no ballast discharge can take place unless the monitor is in the normal operating mode and the relevant sampling point has been connected to the monitor.

.2 Preferably the system should have a minimum number of discharge outlets and sampling points so arranged that discharge can take place via only one sampling point at a time.

.3 Where it is intended that more than one line is used for simultaneous discharge purposes, one oil content meter (*7*), together with a flow meter, shall be installed per discharge line. These instruments shall be connected to a common processing unit.

.4 In order to avoid alarms due to short term high oil concentration signals (spikes) causing indications of high instantaneous rates of discharge, the short term high ppm signal may be suppressed for a maximum of 10 seconds by employing a delay relay. Alternatively, the instantaneous rate of discharge may be the average during the preceding 20

seconds or less as computed from instantaneous ppm values produced by the oil content meter with intervals of a maximum of 5 seconds.

6.1.4 The system should comprise the following:

.1 An oil content meter to measure the oil content of the effluent in parts per million. This meter shall be approved in accordance with the provisions contained in resolution A.393(X)(*8*) and certified to take into account the range of cargoes carried;

.2 A flow rate system to indicate the quantity of effluent being discharged in a unit of time (see also paragraphs 6.3.7 and 6.3.8);

.3 A vessel speed indicating device; to give the vessel's speed in knots (see also paragraphs 6.4.2 and 6.4.3);

.4 A sampling system to convey a representative sample of the effluent to the oil content meter;

.5 A control section which includes:

.5.1 A processor, which accepts signals of oil content, flow rate and the vessel's speed and converts them into litres per nautical mile and the total quantity of oil discharged (see also paragraph 6.5.3);

.5.2 A transmitting device to provide alarms and, where required, command signals to the discharge control arrangement;

.5.3 A recording device to provide, where required, a continuous record of the effluent discharge;

.5.4 A manual override system to be used in the event of failure of the monitoring and control system; and

.5.5 Where required a transmitting device to provide signals to a starting interlock preventing the discharge of effluent before the oil content meter is fully operative.

6.1.5 The electrical components of the system installed in a hazardous area of a vessel shall meet the appropriate safety requirements (*As contained in the provisions of IEC Publication 92 or its equivalent.)(*9*) provided for these areas.

6.1.6 The control section of an oil discharge monitoring and control system shall be capable of operating satisfactorily under the following environmental conditions:

.1 *Ambient air temperature:* 0 °C to 55 °C in enclosed spaces; −25 °C to 55 °C on open decks

.2 *Vibration:* 2.0 Hz to 13.2 Hz, with displacement amplitude of ±1.0 mm 13.2 Hz to 80.0 Hz, with an acceleration amplitude of ±0.7 g

.3 *Voltage variations for alternating current:* permanent variation of ±10%

.4 *Inclination:* inclination at angles of up to 22.5° in any place from the normal operational position

6.2 Sampling system:

6.2.1 Sampling points should be so located that relevant samples can be obtained from those outlets that are used for operational discharges in accordance with paragraph 6.1.1. The sampling probes located in the overboard discharge lines and the piping system connecting the sampling probes to the oil content meter should meet the following requirements:

.1 The piping and probes shall be of corrosion-resistant and oil-resistant material, of adequate strength, properly jointed and supported;

.2 The system shall have a stop valve fitted adjacent to each probe, except that where the probe is mounted in a cargo line, e.g. to the midship cargo manifold arrangement, two stop valves shall be fitted, in series, in the sample line;

.3 Sampling probes should be arranged for easy withdrawal and should as far as practicable be mounted at an accessible location in a vertical section of the discharge line. If a sampling point has to be made in a horizontal section then suitable arrangements should be made to obtain representative samples. Sampling probes should normally penetrate inside the discharge pipe to a distance of one quarter the diameter of that pipe;

.4 Means shall be provided for cleaning the probes and piping system by the provision of permanent clean water flushing arrangements or some other equivalent method, especially in the case of probes mounted in a cargo line. The design of the probes and piping should be such as to minimize their clogging by oil, oily residue and other matter;

.5 The velocity of the fluid in the piping shall be such that, taking into consideration the length of the piping, the overall response time should be as short as possible between an alteration in the mixture being pumped and the alteration in the meter reading and in any case not more than 40 seconds;

.6 The location of sampling probes in relation to any point of flow diversion to a slop tank shall be selected with regard to the need for sampling the oily water in the recirculation mode;

.7 The arrangements for driving the sampling pump or any other pumps such as those provided for washing windows shall have regard to the safety requirements of the space in which the pump is located;

.8 The flushing arrangements should be such that where necessary they can be utilized for stabilizing the oil content meter and for correcting zero setting;

.9 Sample water when returned to the slop tank shall not be allowed to free fall into the tank.

6.3 Flow rate indicating system:

6.3.1 A flow meter for measuring the rate of discharge should be installed in a vertical section of a discharge line or in any other section of discharge line as appropriate, so as to be always filled with the liquid.

6.3.2 A flow meter should employ an operating principle which is suitable for shipboard use and, where relevant, can be used in large diameter pipes.

6.3.3 A flow meter should be suitable for the full range of flow rates that may be encountered during normal operation. Alternatively, arrangements such as the use of two flow meters of different ranges or a restriction of the operational flow rate range may be necessary to meet this requirement.

6.3.4 The flow meter, as installed, should have an accuracy of ±15 percent, or better, of the instantaneous rate throughout the operating range.

6.3.5 Any component part of the flow meter in contact with the effluent discharge including associated piping, if fitted, shall be of corrosion-resistant and oil-resistant material of adequate strength.

6.3.6 The design of the flow metering arrangements shall have regard to the safety requirements of the space in which such metering arrangements are located.

6.3.7 In ships fitted with a computing unit the flow rate may be determined from the pump characteristics and the data manually inserted into the unit.

6.3.8 In ships fitted with a calculating unit the flow rate may be manually inserted into the unit. The flow rate is to be estimated from the best available source e.g. pump characteristics, speed of pump(s), ullages or knowledge of pumping rates for particular tanks on the ship.

6.3.9 In oil tankers where the gravitational discharges of ballast water from the cargo tanks is an established practice, in accordance with Regulation 18(6)(d), means, such as calibration curves, shall be provided to estimate the flow rate of discharge.

6.4 Vessel's speed indicating system:

6.4.1 The automatic speed signal required for the control unit shall be obtained from the vessel's speed indicating device (*See "Recommendation on Performance Standards for Devices to Indicate Speed and Distance (Annex to Resolution A.478(XII)).) by means of a repeater signal. This information shall be readily available in a form that can be accepted by a processor. The speed information used may be either speed over the ground or speed through the water depending upon the speed measuring equipment installed on board.

6.4.2 In ships where a computing unit is required the vessel's speed may be manually inserted into the unit. This data shall be obtained from the ship's log or from an indicating device which transmits signals which need not be in a form which can be accepted by a computer system.

6.4.3 The vessel's speed on ships required to install a calculating unit may be obtained from the ship's log or from the navigation charts and shall be estimated from the most reliable source.

6.5 Processor and transmitting device:

6.5.1 The processor should receive, at time intervals not exceeding 5 seconds, signals from the oil content meter, the flow rate measuring system, and the vessel's speed indicator and automatically compute the following:

.1 Instantaneous rate of discharge of oil in litres per nautical mile; and

.2 Total quantity of oil discharged per voyage in cubic meters or litres.

6.5.2 When the calculations of the processor exceed the limits imposed by Regulation 9(1)(a) (iv) and (v) (*10*) the transmitting device will provide alarms and, in new ships, it will also provide command signals to the discharge valve control which will cause the discharge of effluent into the sea to stop.

6.5.3 In existing ships fitted with a calculating unit where the unit is installed early, the total quantity of oil discharged may be computed manually.

6.6 Recording devices:

6.6.1 Control Unit—

.1 The recording device for a control unit should include a digital printer or an analogue recorder or the combination of both or a recorded visible display. The record shall be identifiable as to the time and date and shall be kept for at least three years (*11*).

.2 The data to be automatically recorded shall include at least the following items:

.2.1 Instantaneous rate of discharge of oil (litres per nautical mile);

.2.2 The total quantity of oil discharged (litres);

.2.3 Time and date (G.m.t.);

.2.4 The discharge valve position (open or closed);

.2.5 Alarm condition;

.2.6 Failure (i.e. no flow, fault, etc.); and

.2.7 Override action (i.e. manual override, flushing, calibrating, etc.).

6.6.2 Computing Unit—

.1 The recording device for a computing unit should include a digital printer or an analogue recorder or the combination of both or a recorded visible display. The record shall be identifiable as to the time and date and shall be kept for at least three years (*11*). Manual input information should be identifiable on the record.

.2 The data to be automatically recorded shall include at least the following items:

.2.1 Instantaneous rate of discharge of oil (litres per nautical mile);

.2.2 The total quantity of oil discharged (litres);

.2.3 Time and date (G.m.t.);

.2.4 Manual input information;

.2.5 The valve position (open or closed);

.2.6 Alarm condition;

.2.7 Failure (i.e. no flow, fault, etc.);

.2.8 Override action (i.e. manual override, flushing, calibration, etc.); and

.2.9 Oil content if flow rate is manually inserted.

6.6.3 Calculating Unit—

.1 An automatic recording device is not required for a calculating unit, but, where fitted, the recording device should include a digital printer or an analogue recorder or the combination of both or a recorded acceptable visible display. The record shall be identifiable as to time and date, which may be entered manually, and shall be kept for at least three years (*11*).

.2 The data to be automatically recorded on the above-mentioned recording device shall include at least the following item: Oil content in ppm, unless the oil content meter is provided with a recorder.

6.6.4 Recording for digital printers.

Occasions of recordings. Data required in paragraphs 6.6.1.2, 6.6.2.2, and 6.6.3.2 of these Specifications shall be printed out with the following minimum frequency:

.1 When the discharge is started;

.2 When the discharge is stopped;

.3 At intervals of not more than 10 minutes;

.4 When an alarm condition is developed;

.5 When normal conditions are restored;

.6 At the change of valve order or valve position;

.7 When introducing input data;

.8 Whenever the computed rate of discharge varies by 10 litres/nautical mile, unless an equivalent trend-indicating arrangement is provided;

.9 When selecting zero setting or calibration mode; and

.10 On manual command.

6.6.5 Recording for analogue recorders.

Data required in paragraphs 6.6.1.2, 6.6.2.2 and 6.6.3.2 of these Specifications should be continuously recorded in such a way as would satisfy the following requirements:

.1 The chart speed should be indicated. If the speed is controllable, the recorder shall be provided with a marker to identify the speed of the chart paper; and

.2 Means shall be provided to enable the chart paper to be interpreted as to time, date and readings after it has been removed from the recorder.

6.7 Data display.

6.7.1 The current data shall be visibly displayed.

6.7.2 The recording device and the data display should be located in a position easily accessible to the person in charge of the operation of discharging the effluent overboard.

6.8 Manually operated alternatives.

6.8.1 The alternative means and information for use in case of any one failure in the system should be as follows:

.1 Oil Content meter: visual observation of the surface of the water (*12*);

.2 Sampling pump: visual observation of the surface of the water;

.3 Flow meter: pump characteristics, etc.;

.4 Vessel's speed indicating device: main engine R.P.M., etc.;

.5 Processor: manual calculation and manual recording; and

.6 Discharge valve control: manual operation of pumps and valves.

6.9 Alarm conditions resulting in the stopping of discharge.

6.9.1 Audio-visual alarms shall be initiated for any of the following conditions:

.1 Whenever the instantaneous rate of discharge of oil exceeds 60 litres per nautical mile;

.2 When the total quantity of oil discharged reaches the allowable limit prescribed by the provisions of the relevant Regulations;

.3 Failure of the system's operation, such as:

.3.1 Power failure;

.3.2 Loss of sample;

.3.3 Failure of the measuring or recording system; or

.3.4 When the input signal of the sensors exceeds the effective capacity of the system.

6.10 Location of alarm indicator

6.10.1 The alarm indicator of the system shall be installed in the cargo control room where provided and/or other places where it will attract immediate attention and action.

7 Equipment, Operation and Maintenance Manuals

7.1 Administrations shall ensure that approved equipment, operational and/or maintenance manuals for the various items comprising the oil discharge monitoring and control systems are on board the vessel. These manuals shall cover the oil content meter, control, computing or calculating unit, flow meter and ship's speed indicator, where required.

FOOTNOTES: (ADDED BY THE U.S. COAST GUARD FOR CLARITY.)

(*1*) The "MARPOL 73/78 Convention" is referred to as the MARPOL Protocol" in 33 CFR, Part 157.

(*2*) Also defined in §157.03(i).

(*3*) The Coast Guard has determined that a starting interlock system is not required on Category IV(a) vessels that are 100,000 DWT or less.

(*4*) The Coast Guard is not publishing this Appendix.

(*5*) Section 157.11(b)(2) requires at least one discharge point.

(*6*) Section 157.37(a) requires all overboard discharges of oily mixtures to be monitored.

(*7*) The "oil content meter" is referred to as a "cargo monitor" in 33 CFR Part 157 and 46 CFR Subpart 162.050.

(*8*) Approval under 46 CFR Subpart 162.050 constitutes compliance with this resolution.

Section 157.12(b) requires that monitors installed on U.S. vessels must be approved under 46 CFR Subpart 162.050.

(*9*) U.S. vessels are required to meet 46 CFR Parts 110–113, Electrical Engineering Regulations, which also constitutes compliance with IEC Publication 92.

(*10*) Sections 157.37(a) (3) and (4) impose the same limits. These limits relate to instantaneous rate and total quantity of oil discharged.

(*11*) Section 157.37(d) also requires that discharge data be kept for three years.

(*12*) Section 157.37(a)(6) also requires visual observation of the discharge if the system fails.

[CGD 75–124a, 48 FR 45723, Oct. 6, 1983]

APPENDIX G TO PART 157—TIMETABLES FOR APPLICATION OF DOUBLE HULL REQUIREMENTS

1. *Source.* These timetables conform to 46 U.S.C. 3703a(c).

2. *Timetables.*

(a) In this section, the age of a vessel is determined from the later of the date on which the vessel is—

(1) Delivered after original construction;

(2) Delivered after completion of a major conversion; or

(3) Qualified for documentation under section 4136 of the Revised Statutes of the United States (46 U.S.C. app. 14).

(b) A vessel of less than 5,000 gross tons for which a building contract or contract for major conversion was placed before June 30, 1990, and that is delivered under that contract before January 1, 1994, and a vessel that had its appraised salvage value determined by the Coast Guard before June 30, 1990, and that qualifies for documentation under section 4136 of the Revised Statutes of the United States (46 U.S.C. app. 14) before January 1, 1994, may not operate in the navigable waters or the Exclusive Economic Zone of the United States after January 1, 2015, unless equipped with a double hull or with a double containment system determined by the Coast Guard to be as effective as a double hull for the prevention of a discharge of oil.

(c) A vessel for which a building contract or contract for major conversion was placed before June 30, 1990, and that is delivered under that contract before January 1, 1994, and a vessel that had its appraised salvage determined by the Coast Guard before June 30, 1990, and that qualifies for documentation under 46 CFR subpart 67.19 before January 1, 1994, may not operate in the navigable waters or Exclusive Economic Zone of the United States unless equipped with a double hull—

(1) In the case of vessel of at least 5,000 gross tons but less than 15,000 gross tons—

(i) After January 1, 1995, if the vessel is 40 years old or older and has a single hull, or is 45 years old or older and has a double bottom or double sides;

(ii) After January 1, 1996, if the vessel is 39 years old or older and has a single hull, or is 44 years old or older and has a double bottom or double sides;

(iii) After January 1, 1997, if the vessel is 38 years old or older and has a single hull, or is 43 years old or older and has a double bottom or double sides;

(iv) After Janaury 1, 1998, is the vessel is 37 years old or older and has a single hull, or is 42 years old or older and has a double bottom or double sides;

(v) After January 1, 1999, if the vessel is 36 years old or older and has a single hull, or is 41 years old or older and has a double bottom or double sides;

(vi) After January 1, 2000, if the vessel is 35 years old or older and has a single hull, or is 40 years old or older and has a double bottom or double sides;

(vii) After January 1, 2005, if the vessel is 25 years old or older and has a single hull, or is 30 years old or older and has a double bottom or double sides;

(2) In the case of a vessel of at least 15,000 gross tons but less than 30,000 gross tons—

(i) After January 1, 1995, if the vessel is 40 years old or older and has a single hull, or is 45 years old or older and has a double bottom or double sides;

(ii) After January 1, 1996, if the vessel is 38 years old or older and has a single hull, or is 43 years old or older and has a double bottom or double sides;

(iii) After January 1, 1997, if the vessel is 36 years old or older and has a single hull, or is 41 years old or older and has a double bottom or double side;

(iv) After January 1, 1998, if the vessel is 34 years old or older and has a single hull, or is 39 years old or older and has a double bottom or double sides;

(v) After January 1, 1999, if the vessel is 32 years old or older and has a single hull, or is 37 years old or older and has a double bottom or double sides;

(vi) After January 1, 2000, if the vessel is 30 years old or older and has a single hull, or is 35 years old or older and has a double bottom or double sides;

(vii) After January 1, 2001, if the vessel is 29 years old or older and has a single hull, or is 34 years old or older and has a double bottom or double sides;

(viii) After January 1, 2002, if the vessel is 28 years old or older and has a single hull, or is 33 years old or older and has a double bottom or double sides;

(ix) After January 1, 2003, if the vessel is 27 years old or older and has a single hull, or is 32 years old or older and has a double bottom or double sides;

(x) After Janaury 1, 2004, if the vessel is 26 years old or older and has a single hull, or is 31 years old or older and has a double bottom or double sides;

(xi) After January 1, 2005, if the vessel is 25 years old or older and has a single hull, or is 30 years old or older and has a double bottom or double sides; and

(3) In the case of a vessel of at least 30,000 gross tons—

(i) After January 1, 1995, if the vessel is 28 years old or older and has a single hull, or is 33 years old or older and has a double bottom or double sides;

(ii) After January 1, 1996, if the vessel is 27 years old or older and has a single hull, or is 32 years old or older and has a double bottom or double sides;

(iii) After January 1, 1997, if the vessel is 26 years old or older and has a single hull, or is 31 years old or older and has a double bottom or double sides;

(iv) After January 1, 1998, if the vessel is 25 years old or older and has a single hull, or is 30 years old or older and has a double bottom or double sides;

(v) After January 1, 1999, if the vessel is 24 years old or older and has a single hull, or is 29 years old or older and has a double bottom or double sides;

(vi) After January 1, 2000, if the vessel is 23 years old or older and has a single hull, or is 28 years old or older and has a double bottom or double sides;

(d) Except as provided in paragraph (b) of this section—

(1) A vessel that has a single hull may not operate after January 1, 2010, and

(2) A vessel that has a double bottom or double sides may not operate after January 1, 2015.

NOTE: Double sides and double bottoms must meet the requirements in §157.10d(c) or (d), as appropriate. A vessel will be considered to have a single hull if it does not have double sides and a double bottom that meet the requirements in §157.10d(c) and §157.10d(d). To determine a tank vessel's double hull compliance date under OPA 90, use the vessel's hull configuration (*i.e.*, single hull; single hull with double sides; or single hull with double bottom) on August 18, 1990. The conversion of a single hull tank vessel to include only double sides or only a double bottom after August 18, 1990, will not result in a change of the vessel's originally scheduled phase-out date. The conversion of a single hull tank vessel to a double hull tank vessel meeting the requirements of §157.10d complies with OPA 90.

[CGD 90–051, 57 FR 36245, Aug. 12, 1992, as amended by USCG–1999–6164, 65 FR 39262, June 23, 2000]

PART 158—RECEPTION FACILITIES FOR OIL, NOXIOUS LIQUID SUBSTANCES, AND GARBAGE

Subpart A—General

Sec.

SUSPENSION, REVOCATION, AND APPEALS

Subpart B—Criteria for Reception Facilities: Oily Mixtures

Subpart C—Criteria for Certifying That a Port's or Terminal's Facilities Are Adequate for Receiving NLS Residue